

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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| Applicant(s): Singh, et al. | |
| Application No.: 10/604,166 | |
| Filed: 6/28/2003 | Group Art Unit: 1714 |
| Title: Transparent Flame Retardant Polycarbonate Compositions | Examiner: Tae H. Yoon |
| Attorney Docket No.: GEPL.P-072 | Confirmation No. 1165 |

BRIEF FOR APPELLANT

This brief is filed in support of Applicants' Appeal from the rejection mailed June 7, 2006. This application has been twice rejected, and therefore appeal is permissible. Consideration of the application and reversal of the rejections are respectfully urged.

Real Party in Interest

The real party in interest is General Electric Company.

Related Appeals and Interferences

To Applicants' knowledge, there are no related appeals or interferences.

Status of Claims

Claims 1-29 are pending in this application. Claims 1-29 are rejected and are the subject of this appeal. No other claims have been presented.

Status of Amendments

No amendments after final have been filed. All amendments have been entered.

Summary of Claimed Subject Matter

As reflected in independent claim 1, the present application relates to a polycarbonate composition. The composition comprises a polycarbonate produced in a base-catalyzed melt polymerization reaction (§ 013) to which an acidic quencher (§ 014) has been added in a 1 to 30-fold molar ratio with respect to the amount of initial basic catalyst (§ 016). The composition also contains a flame-retardant component comprising a potassium perfluoroalkane sulfonate and a cyclic siloxane (§§ 019-023). These two components work in combination such that the composition achieves a V0 UL flammability rating at a thickness of 2 mm and has a haze of no more than 1%. (§ 024)

Grounds of Rejection to be reviewed on Appeal

Claims 1-29 stand rejected under 35 USC § 112, first paragraph, for lack of enablement.

Claims 1-29 stand rejected under 35 USC § 102(b) as anticipated by, or under 35 USC § 103(a) as obvious over US Patent No. 6,353,046 of Rosenquist et al.

Claims 1-29 stand rejected under 35 USC § 103(a) as obvious over Rosenquist in view of US Patent No. 5,606,007 of Sakashita et al, and US 6,136,945 of Mestanza.

Claims 1-29 stand rejected under 35 USC § 103(a) as obvious over US Patent No. 4,130,530 of Mark et al, in view of Rosenquist and US Patent No. 3,775,367 of Nouvertne et al, and further in view of Sakashita et al, and Mestanza.

Argument

A. The Enablement Rejection

Claims 1-29 stand rejected under 35 USC § 112, first paragraph, for lack of enablement. In the Official Action of June 7, 2006, the Examiner states that the specification provides enablement for "a ratio of butyl tosylate to sodium of from 1.2 to 24.2" based on the teachings of Table 1, or a ratio "of phosphorous acid to sodium from 6.1 to 12.1" based on the data in Table 2. The Examiner states, however, that the full scope of the claims is not enabled.

In the present case, independent claim 1 refers to an acidic quencher generically and states that the acid quencher is added in a 1 to 30 fold molar ratio relative to the amount of initial basic catalyst. Two specific acid quenchers are disclosed and data is provided showing the effectiveness of these quenchers within this range. The Examiner concern is based on the fact that these quenchers are not shown to work over the entire range, and indeed some specific examples with values of molar ratio within this range are shown not to achieve the properties. What the Examiner fails to grasp is that the claim is directed to acid quenchers generically, and that specific quenchers will have specific preferred ranges within the generic range of a 1 to 30 fold molar ratio. This is not a basis for a rejection for lack of enablement.

It is well established that the inclusion of potentially inoperative embodiments within the scope of the claims is not, in and of itself, a basis for a rejection for lack of enablement. *In re Dinh-Nguyen*, 181 USPQ 46, 48 (CCPA 1974) ("It is not the function of the claims to exclude possible inoperative embodiments."); *In re Kamal*, 158 USPQ 320 (CCPA 1968) (Possibility of inclusion of inoperative substances does not prevent allowance of broad claims); *In re Anderson*, 176 USPQ 331 (CCPA 1973) (specification as a whole must be considered in determining if support exists for subject matter; claim need not be limited to operative embodiments in skilled pharmaceutical art). Here, Applicants disclose an overall range and show specific results for two entirely different types of acidic quenchers which fall within this range.

The Examiner's arguments are based on a detailed examination of the results, but they do not established a basis for lack of enablement. For example, the Examiner argues that Batches 3 and 4 in Table 2, in which the quencher is phosphorous acid and the molar ratio is 18.5 or 30.5 respectively, show lack of enablement because the results the composition does not achieve a V0 rating. As a first matter, it is pointed out that these examples are not within the scope of the claims, because the final limitation, namely selection of an amount of the two components to achieve te V0 rating, is not met. Moreover, it cannot be argued that these examples create any requirement for experimentation because the specification teaches that when the quencher is phosphorous acid, the molar ratio should be in the range of 1 to 15 percent, i.e, below the values

in the examples that the Examiner relies on. That some combinations of acidic quencher and the molar weight ratio recited in the claims may be unsuitable is not dispositive. *Ex parte Mark*, 12 USPQ 2d 1904 (POBAI 1989)

The person skilled in the art would understand that different quenchers may operate best, and indeed require different molar ratios within the claimed range in order to achieve the desired and claimed results. The Examiner has offered no reasoning, however, that would support a conclusion that such optimization within a numerically defined range would require undue experimentation. Since a *prima facie* case for lack of enablement requires such reasoning, the rejection in the present case should be reversed. *In re Strahilevitz*, 212 U.S.P.Q. 561, 563 (C.C.P.A. 1982); *In re Marzocchi*, 169 USPQ 367 (CCPA 1971).

Applicants further note that the claims require two components working together to give rise to the desired fire-retardance rating. In the examples, all of the batches use the same amount of the "flame-retardant component comprising a potassium perfluoroalkane sulfonate and a cyclic siloxane." In arguing against enablement the Examiner has completely ignored this component, and the fact that a person skilled in the art could readily increase this component to increase the flame retardance as well. Thus, the rejection is not founded on a consideration of the invention as a whole and what the specification teaches, but on a hyper-critical focus on the examples.

Furthermore, the arguments raised by the Examiner are not relevant to all of the claims, and these claims are properly considered separately as discussed below.

Claims 7, 9, 21, 23, 27 and 29 state that the acidic quencher is phosphorous acid and that the molar ratio is 1 to 15. The Examiner states that "Applicants failed to show that a molar ratio of 1 to 15 would yield a V0 rating, especially since Batch 2 (molar ratio of 1.2) shows UL rating of V2." (Office Action, Page 2) This argument makes no sense, because Batch 2 in Table 1 is a formulation made using a different acidic quencher, butyl tosylate, and not phosphorous acid. The specification in this case makes an unequivocal statement that in the case of phosphorous acid, the molar ratio should be between 1 and 15. (§ 030). Given this statement, the specification "*must* be taken as in compliance with the enabling requirement of the first paragraph of § 112,

unless there is a reason to doubt the objective truth of the statements contained therein, which must be relied upon for an enabling disclosure." *In re Marzocchi*, 169 USPQ 367 (CCPA 1971). The Examiner has offered no credible reasons and therefore the rejection as to these claims should be reversed.

Claims 6, 8, 12, 14, 20, 22, 26 and 28 state that the acidic quencher is butyl tosylate and that it is used at a level of 1 to 10 ppm. This is consistent with the data in Table I for Batches 3-8, which provides V0 results in every case. The Examiner has not addressed how these claims are not enabled and thus has clearly not provided a *prima facie* case for lack of enablement.

B. The Anticipation/Obviousness Rejection

Claims 1-29 stand rejected under 35 USC § 102(b) as anticipated by, or under 35 USC § 103(a) as obvious over US Patent No. 6,353,046 of Rosenquist et al. In an anticipation rejection, "it is incumbent upon the examiner to identify wherein each and every facet of the claimed invention is disclosed in the applied reference." *Ex parte Levy*, 17 USPQ2d 1461, 1464 (BPAI 1990) *citing*, *Lindemann Maschinenfabrik GmbH v. American Hoist and Derrick*, 730 F.2d 1452, 221 USPQ 481 (Fed. Cir. 1984). Furthermore, to establish anticipation under the theory of inherency, "the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." *Id.* "Inherency . . . may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." *In re Robertson*, 49 USPQ2d 1949, 1951 (Fed. Cir. 1999). This standard is not met in the present case.

The Examiner states that Rosenquist teaches a flame retardant polycarbonate containing perfluoroalkane sulfonate and cyclic siloxane, and that Example 2 shows a UL94 V0 rating and a low haze value. Rosenquist does not expressly teach that the polycarbonate used in the composition was made by a base-catalyzed melt polymerization, or that an acidic quencher was added. Thus, Rosenquist does not teach each and every element of the claimed invention.

The Examiner states that "with respect to the molar ratio of an acidic quencher to a basic catalyst, the instant claims are directed to a polycarbonate composition, and thus the recited polymerization process for a polycarbonate has little probative value." This is incorrect. The use of a basic catalyst and an acidic quencher necessarily means that there are residual components present in the polycarbonate and thus that the composition is different. In fact, the present specification teaches that these residual components have an important effect on the character of the polycarbonate. (§ 0009) The Examiner may not infer that these components are present in the compositions of Rosenquist, because other possibilities exist. Furthermore, the compositions described in Rosenquist have different properties than those of the present invention, which would lead to the conclusion that they are not made by this method. Comparing the two examples of Rosenquist which have amounts of flame retardants flanking the amount used in the present examples, that in one case (Table 2A, Col. 7) the haze is 1.6 %, while in the other (Table 2B, col 3) the haze is 1.4%. In neither case is it less than 1% as achieved in the compositions of the invention. Furthermore, the Examiner incorrectly states that because a V0 rating is achieved at 75 mil (1.9 mm) in the reference it would inherently be met at a thickness of 1.6 mil as recited in claim 3. As material gets thinner, it becomes more difficult to achieve a passing rating. Thus, the Examiner's argument does not follow logically from the applicable science. Furthermore, Rosenquist states in Example 2 that at a thickness of 60 mil (1.5 mm) the performance was "only marginal." Thus, there is no basis for the assertion of inherency on which the rejection rests. Thus, the rejection for anticipation should be reversed.

C. Obviousness Rejections

1. Rosenquist in view of Sakashita et al and Mestanza

Claims 1-29 stand rejected under 35 USC § 103(a) as obvious over Rosenquist in view of US Patent No. 5,606,007 of Sakashita et al, and US 6,136,945 of Mestanza. In this rejection, the Examiner relies on the same flawed interpretation of Rosenquist as described above. Sakashita

and Mestanza are offered for a teaching that "the use of an acidic quencher in producing polycarbonates is a routine practice in the art." (Office Action of 1/4/2006, Page 4) However, the Examiner fails to take into account the observed properties of the compositions of the inventions which are clearly not predicted based on the teachings of the art. First of all, the tests reported in the present application report that there are both a minimum and a maximum amount of acidic quencher that is appropriate. Second, within this range, the compositions offer desirable characteristics, in particular low haze levels, which are not suggested by the cited art.

As noted above, Rosenquist does not teach that the polycarbonate compositions described therein are made with a basic catalyst and an acidic quencher. Sakashita and Mestanza may establish that this is one way that the Rosenquist compositions could have been made, but there are other choices as well. Moreover, nothing in the cited references suggests that the claimed choice of catalyst/quenching options and the combination of flame retardants would provide the benefits observed for the compositions of the invention. Thus, the claimed invention would not have been obvious and the rejection should be reversed.

Mark et al, in view of Rosenquist, Nouvertne, Sakashita, and Mestanza

The Examiner has also rejected claims 1-29 as obvious over a combination of five reference. In this case, the primary reference is US Patent No. 4,130,530 of Mark et al. This rejection is at best cumulative with the rejection discussed above. As characterized by the Examiner, Mark et al, discloses a "polycarbonate composition plasticized with the instant cyclic siloxane." (Office Action of January 4, 2006, Page 5) The Examiner acknowledges that Mark does not disclose the perfluoroalkanesulfonate or the use of an acidic quencher, but offers Rosenquist or Nouvertne as teaching the perfluoroalkane sulfonate, and Sakashita or Mestanza as teaching acidic quenchers.

Applicants note that the disclosure of Mark et al is less close to the present invention than that of Rosenquist et al. In Mark et al, the example polycarbonate is made using an interfacial process. Thus, it cannot be argued that this material could have been made with a base catalyzed

melt polymerization process because it is not a melt polymerization process at all. Furthermore, Sakashita and Mestanza both relate to products of melt polymerization reactions. The Examiner has offered no reasons why a person skilled in the art would use these to add an acidic quencher to a reaction other than a melt polymerization reaction. Thus, this rejection should be reversed.

The Evidence Is Commensurate with the Scope of the Claims

In the Official Action of January 4, 2006 (Page 6) the Examiner states that "the base and acidic quenchers of claims are broader than the actual showing." This argument is apparently made with respect to all of the claims, even though there are claims presented with differing scopes, including claims which are quite specific to the examples. In the Advisory Action mailed April 24, 2006 (Page 4) the Examiner stated that a basic catalyst could be an amine compound, and it is uncertain whether said amine compound would act in the same manner as said sodium salt. He further stated that "claim 2 reciting a sodium salt as the basic catalyst does not address a particular acidic quencher, and thus the scope of the claims is broader than the actual invention."

Claims 1, 24 and 25

Claim 1 refers to a base-catalyzed polymerization reaction and an acidic quencher. The examples show one type of base catalyst (a sodium salt) and two types of acid quenchers. The two types of acid quenchers are very different from each other, with one being a Lewis acid and the other being a Bronstead acid. These two acids are fairly representative of the broad class of acidic compounds.

The Examiner's explanation of why these two acids are not fairly representative goes back once again to a consideration of a minutiae of the data, and the fact that both acids do not work to produce compositions with the claimed properties at exactly the same molar ratios. This should not be surprising since they are different types of acids, with different strengths. Moreover, the fact remains that both acids do work, and both demonstrate the same results when used at the appropriate concentration.

With respect to the type of base catalyst, the examiner has offers amines as examples of bases, but has offered no reasons why these might reasonably be expected to behave differently from sodium salts since the common element to both is their basicity.

Thus, Applicants submit that the evidence fairly establishes unexpected results with respect to claim 1.

Claims 24 and 25 provide narrower ranges of the molar ratio based on the specific number that achieved a V0 rating in Table 1.

Claims 2-5, 10, 11, and 16-19

Claim 2 depends from claim 1 and specifies that the base is a sodium salt. Thus, the only issue for claim 2 relates to the definition of the acid. As explained above, the two acids tested are fairly representative of acids as a whole, and therefore the test results are commensurate in scope with claim 2, and also therefore with claims 3-5, 10, 11 and 16-19 dependent thereon.

Claim 6, 12, and 20

Claims 6 and 12 specify that the basic quencher is a sodium salt (from claim 2), the nature of the cyclic siloxane (from claim 4 or 10), the nature of the perfluoroalkane sulfonate (from claim 5 or 11), that the acidic quencher is butyl tosylate, and that the butyl tosylate is present in an amount of 1 to 10 ppm. This is the concentration range from Table 1 over which the butyl tosylate achieved a V0 rating. (Batches 2 to 8). Thus, claims 6 and 12 are commensurate in scope with the evidence. Claim 20 includes these limitation plus specifically identifies the basic catalyst as sodium hydroxide.

Claim 7, 13 and 21

Claims 6 and 13 specify that the basic quencher is a sodium salt (from claim 2), the nature of the cyclic siloxane (from claim 4 or 10), the nature of the perfluoroalkane sulfonate (from claim 5 or 11), that the acidic quencher is phosphorous acid and that the phosphorous acid

is used at a molar ratio of 1 to 15 with respect to the initial base catalyst. Table 2 shows test results for molar ratios of 6.1 and 12.1 achieving V0 and mixed results (V0/V1) at a ratio of 18.3. The upper level of 15 in the claimed range is reasonably represented in this data. The lower level is based on the observation that in the samples tested, the flame out time was still on the decrease, and thus that the bottom end of the range had not been reached. Thus, the evidence and claims 7 and 13 are commensurate in scope. Claim 21 includes these limitation plus specifically identifies the basic catalyst as sodium hydroxide.

Claim 8, 14 and 22

Claims 8 and 14 specify that the basic quencher is a sodium salt (from claim 2), the nature of the cyclic siloxane (from claim 4 or 10), that the acidic quencher is butyl tosylate, and that the butyl tosylate is present in an amount of 1 to 10 ppm. This is the concentration range from Table 1 over which the butyl tosylate achieved a V0 rating. (Batches 2 to 8). Thus, claim 8s and 14 are commensurate in scope with the evidence. Claim 22 includes these limitation plus specifically identifies the basic catalyst as sodium hydroxide.

Claim 9, 15 and 23

Claims 9 and 15 specify that the basic quencher is a sodium salt (from claim 2), the nature of the cyclic siloxane (from claim 4 or 10), that the acidic quencher is phosphorous acid and that the phosphorous acid is used at a molar ratio of 1 to 15 with respect to the initial base catalyst. Table 2 shows test results for molar ratios of 6.1 and 12.1 achieving V0 and mixed results (V0/V1) at a ratio of 18.3. The upper level of 15 in the claimed range is reasonably represented in this data. The lower level is based on the observation that in the samples tested, the flame out time was still on the decrease, and thus that the bottom end of the range had not been reached. Thus, the evidence and claims 9 and 15 are commensurate in scope. Claim 23 includes these limitation plus specifically identifies the basic catalyst as sodium hydroxide.

Claim 26 and 28

Claims 26 and 28 includes the limitations that the basic catalyst is sodium hydroxide (from claim 16) or a sodium salt (from claim 2), that the that the acidic quencher is butyl tosylate, and that the butyl tosylate is present in an amount of 1 to 10 ppm. This is the concentration range from Table 1 over which the butyl tosylate achieved a V0 rating. (Batches 2 to 8). Thus, claims 26 and 28 are commensurate in scope with the evidence.

Claims 27 and 29

Claims 27 and 29 includes the limitations that the basic catalyst is sodium hydroxide (from claim 16) or a sodium salt (from claim 2), that the that the acidic quencher is phosphorous acid and that the phosphorous acid is used at a molar ratio of 1 to 15 with respect to the initial base catalyst. Table 2 shows test results for molar ratios of 6.1 and 12.1 achieving V0 and mixed results (V0/V1) at a ratio of 18.3. The upper level of 15 in the claimed range is reasonably represented in this data. The lower level is based on the observation that in the samples tested, the flame out time was still on the decrease, and thus that the bottom end of the range had not been reached. Thus, the evidence and claims 27 and 29 are commensurate in scope.

Conclusion

For the reason set forth above, the rejections in this case should be reversed. The Examiner has improperly used the completeness of the teachings in the application as evidence of lack of enablement and has failed to present a valid basis for the obviousness rejection that takes into account the invention as a whole. Further, the Examiner has failed to appreciate the

scope of the various claims and the fact that the evidence as presented is representative with respect to these claims. Reversal of the rejections is therefore urged.

Respectfully submitted,

A handwritten signature in cursive script, reading "Marina T. Larson".

Marina T. Larson Ph.D.

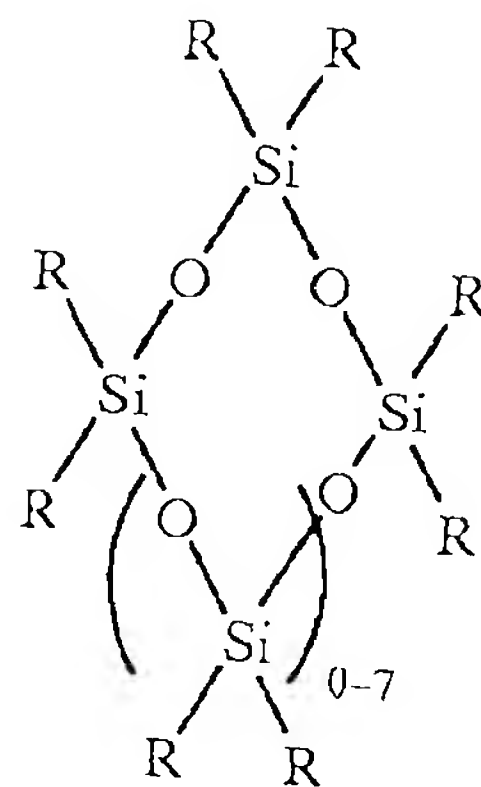
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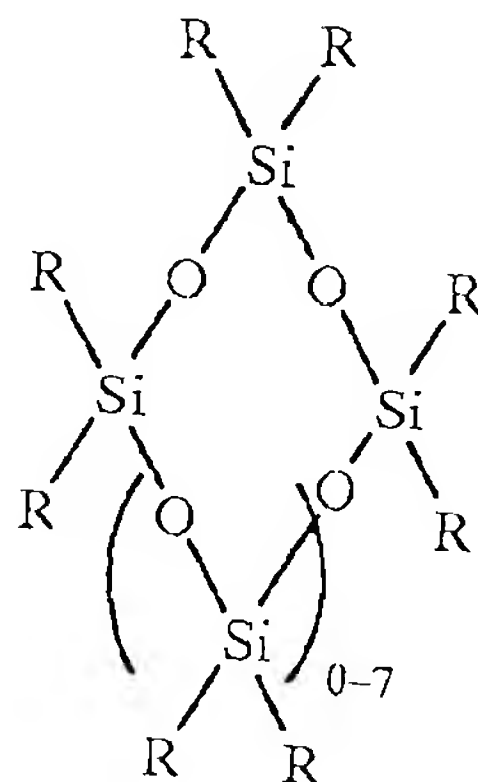
Claims Appendix

1. A polycarbonate composition comprising:
 - (a) polycarbonate produced in a base-catalyzed melt polymerization reaction to which an acidic quencher has been added in a 1 to 30-fold molar ratio with respect to the amount of initial basic catalyst; and
 - (b) a flame-retardant component comprising a potassium perfluoroalkane sulfonate and a cyclic siloxane, wherein components (a) and (b) work in combination such that the composition achieves a V0 UL flammability rating at a thickness of 2 mm and has a haze of no more than 1%.
2. The composition of claim 1, wherein the base catalyst employed in the base-catalyzed melt polymerization reaction is a sodium salt.
3. The composition of claim 2, wherein components (a) and (b) work in combination such that the composition achieves a V0 UL flammability rating at a thickness of 1.6 mm.
4. The composition of claim 3, wherein the cyclic siloxane has the formula:



wherein R is independently selected from the group consisting of C₁ to C₃₆ alkyl, fluorinated or perfluorinated C₁ to C₃₆ alkyl, C₁ to C₃₆ alkoxy, C₆ to C₁₄ aryl, aryloxy of 6 to 14 carbon atoms, arylalkoxy of 7 to 36 carbon atoms, and C₁ to C₃₆ alkyl-substituted aryl of 6 to 14 carbon atoms.

5. The composition of claim 4, wherein the potassium perfluoroalkane sulfonate is potassium perfluorobutane sulfonate.
6. The composition according to claim 5, wherein the acidic quencher is butyl tosylate at a level of 1 to 10 ppm.
7. The composition according to claim 5, wherein the acidic quencher is phosphorous acid at a molar ratio of 1 to 15 with respect to the initial base catalyst.
8. The composition according to claim 4, wherein the acidic quencher is butyl tosylate at a level of 1 to 10 ppm.
9. The composition according to claim 4, wherein the acidic quencher is phosphorous acid at a molar ratio of 1 to 15 with respect to the initial base catalyst.
10. The composition of claim 2, wherein the cyclic siloxane has the formula:



wherein R is independently selected from the group consisting of C₁ to C₃₆ alkyl, fluorinated or perfluorinated C₁ to C₃₆ alkyl, C₁ to C₃₆ alkoxy, C₆ to C₁₄ aryl, aryloxy of 6 to 14 carbon atoms, arylalkoxy of 7 to 36 carbon atoms, and C₁ to C₃₆ alkyl-substituted aryl of 6 to 14 carbon atoms.

11. The composition of claim 10, wherein the potassium perfluoroalkane sulfonate is potassium perfluorobutane sulfonate.
12. The composition according to claim 11, wherein the acidic quencher is butyl tosylate at a level of 1 to 10 ppm.

13. The composition according to claim 11, wherein the acidic quencher is phosphorous acid at a molar ratio of 1 to 15 with respect to the initial base catalyst.

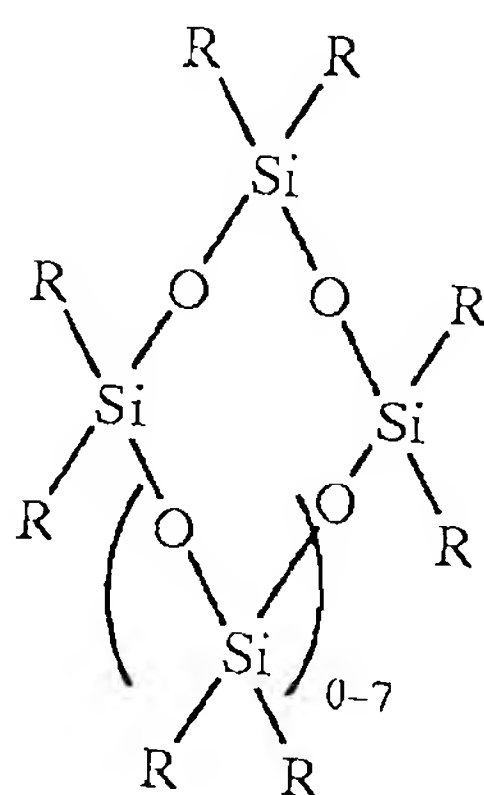
14. The composition according to claim 10, wherein the acidic quencher is butyl tosylate at a level of 1 to 10 ppm.

15. The composition according to claim 10, wherein the acidic quencher is phosphorous acid at a molar ratio of 1 to 15 with respect to the initial base catalyst.

16. The composition of claim 2, wherein the base catalyst employed in the base-catalyzed melt polymerization reaction is sodium hydroxide.

17. The composition of claim 16, wherein components (a) and (b) work in combination such that the composition achieves a V0 UL flammability rating at a thickness of 1.6 mm.

18. The composition of claim 17, wherein the cyclic siloxane has the formula:



wherein R is independently selected from the group consisting of C₁ to C₃₆ alkyl, fluorinated or perfluorinated C₁ to C₃₆ alkyl, C₁ to C₃₆ alkoxy, C₆ to C₁₄ aryl, aryloxy of 6 to 14 carbon atoms, arylalkoxy of 7 to 36 carbon atoms, and C₁ to C₃₆ alkyl-substituted aryl of 6 to 14 carbon atoms.

19. The composition of claim 18, wherein the potassium perfluoroalkane sulfonate is potassium perfluorobutane sulfonate.

20. The composition according to claim 19, wherein the acidic quencher is butyl tosylate at a level of 1 to 10 ppm.

21. The composition according to claim 19, wherein the acidic quencher is phosphorous acid at a molar ratio of 1 to 15 with respect to the initial base catalyst.
22. The composition according to claim 18, wherein the acidic quencher is butyl tosylate at a level of 1 to 10 ppm.
23. The composition according to claim 18, wherein the acidic quencher is phosphorous acid at a molar ratio of 1 to 15 with respect to the initial base catalyst.
24. The composition according to claim 1, wherein the molar ratio is from about 2 to 25.
25. The composition according to claim 1, wherein the molar ratio is from 2.4 to 24.
26. The composition according to claim 16, wherein the acidic quencher is butyl tosylate at a level of 1 to 10 ppm.
27. The composition according to claim 16, wherein the acidic quencher is phosphorous acid at a molar ratio of 1 to 15 with respect to the initial base catalyst.
28. The composition according to claim 2, wherein the acidic quencher is butyl tosylate at a level of 1 to 10 ppm.
29. The composition according to claim 2, wherein the acidic quencher is phosphorous acid at a molar ratio of 1 to 15 with respect to the initial base catalyst.

Evidence Appendix

none

Related Proceedings Appendix

none